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Statistical Analysis of the Annual Average F.O.B. Prices of Canned Apricots, 1926-27 to 1949-50

by

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Statistical Analysis of the Annual Average F.O.B. Prices of Canned Apricots, 1926-27 to 1949-50

Sidney Hoos[1/]

The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned apricots by canners in California from 1926-27 through 1949-50. The years 1941-42 through 1946-47 were excluded from the analysis because of the abnormal conditions which prevailed during the war years, such as federal price control, and in 1946-47 when a large proportion of canner shipments went into the refilling of the supply pipe line rather than into consumers' hands.

In this analysis the average relationships which prevailed between the f.o.b. prices of canned apricots and three factors were measured. These three factors are (1) total domestic shipments of California canned apricots; (2) index of nonagricultural income payments in the United States; and (3) adjusted index of prices of competing canned fruits.

The average relations between the f.o.b. price and each of the independent variables are shown graphically by the lines in figure 1. Expressed in numerical terms these average relations are as follows:

(a) A change of one million cases in domestic shipments of California canned apricots, with nonagricultural income and with competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of about 36 cents a case in the f.o.b. price of canned apricots. This average relation is shown by the diagonal line in panel A of figure 1.

1/ Associate Professor of Agricultural Economics, Associate Agricultural Economist in the Experiment Station and on the Giannini Foundation.

Statistical Analysis of the Annual Average F.O.B. Prices of Canned Apricots, 1925-27 to 1929-30

Sidney Hoos[1]

The purpose of this report is to present the results of a statistical analysis of the major factors which have influenced the annual average f.o.b. prices received for canned apricots by canners in California from 1925-27 through 1929-30. The years 1941-42 through 1945-47 were excluded from the analysis because of the abnormal conditions which prevailed during the war years, such as federal price control, and in 1946-47 when a large proportion of canner shipments went into the refilling of the supply pipe rather than into consumers' hands.

In this analysis the average relationship which prevailed between the f.o.b. prices of canned apricots and three factors were measured. These three factors are (1) total receipts and shipments of California canned apricots; (2) index of manufacturing industrial income payments in the United States; and (3) adjusted indexes of prices of competing canned fruits.

The average relations between the f.o.b. price and each of the independent variables are shown graphically by the lines in Figure 1. Expressed in numerical terms these average relations are as follows:

(a) An change of one million cases in domestic shipments of California canned apricots, with manufacturing income and with competing canned fruit prices held constant, was on the average accompanied by a change in the opposite direction of about 38 cents a case in the f.o.b. price of canned apricots. This average relation is shown by the diagonal line in panel A of Figure 1.

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(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of California canned apricots and with prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of about 29 cents a case in the f.o.b. price of California canned apricots. This average relation is shown by the curve in panel B of figure 1.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits, with domestic shipments of California canned apricots and with nonagricultural income held constant, was on the average accompanied by a change in the same direction of about 30 cents a case in the f.o.b. price of California canned apricots. This average relation is shown by the diagonal line in panel C of figure 1.

Differences between the actual prices and those explained by the statistical analysis are given in table 4, column 3. These differences are plotted as deviations from the diagonal (net regression) lines in panels A, B, and C of figure 1.

The f.o.b. prices of canned apricots used in the report are industry average prices; they are based on records of canners, and reflect actual operations of the canneries packing apricots in California.

The domestic movement of canned apricots from California canners has been derived from statistics issued by the Canners League of California; the total movement from canneries has been adjusted for exports to derive the movement to the domestic market.

The index of United States nonagricultural income is based on reports issued by the United States Department of Commerce. At the time the analysis was made, nonagricultural income figures for the 1949-50 season were available only through April 1950. Also, it must be noted that during January-April 1950 some 2.482 billion dollars were distributed to veterans in connection with insurance dividend adjustments. Such disbursements to veterans began in the middle of January

(b) A change of 10 per cent in the index of nonagricultural income in the United States, with domestic shipments of California canned apricots and with prices of competing canned fruits held constant, was on the average accompanied by a change in the same direction of about 25 cents a case in the f.o.b. price of California canned apricots. This average relation is shown by the curve in panel B of figure 1.

(c) A change of 10 points in the adjusted index of prices of competing canned fruits, with domestic shipments of California canned apricots and with nonagricultural income held constant, was on the average accompanied by a change in the same direction of about 30 cents a case in the f.o.b. price of California canned apricots. This average relation is shown by the diagonal line in panel C of figure 1.

Differences between the actual prices and those explained by the statistical analysis are given in table 4, column 6. These differences are plotted as deviations from the diagonal (net regression) lines in panels A, B, and C of figure 1.

The f.o.b. prices of canned apricots used in the report are industry average prices; they are based on records of canneries, and reflect actual operations of the canneries packing apricots in California.

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1950 and continued through the rest of the 1949-50 marketing season. The reported nonagricultural income figures, therefore, have been adjusted for the veteran insurance dividend disbursements noted above. In the nonagricultural income figures used for 1949-50 in the analysis, it has been necessary to estimate the value for May 1950; it has been estimated at the average value reflecting the 3-month period February 1950 through April 1950.

The level of competing canned fruit prices has been measured by an index constructed in the same manner as in the previous reports on canned apricots; the construction of the index is explained in some detail in table 3 appended to this report. Here, it may be noted that the f.o.b. prices of canned Bartlett pears are based on reports from California and Northwest canneries, and reflect actual operations of Pacific Coast canneries packing Bartlett pears. The f.o.b. prices of canned clingstone peaches are based on reports from California canners, and also reflect actual operations of the packers. The prices for canned Bartlett pears and canned apricots were compiled by the Canners League of California, and the prices of canned clingstone peaches were compiled by the Cling Peach Advisory Board. The prices of canned Hawaiian pineapple are based on published quotations supplemented by available trade information.

Specific sources for the several series of data used in the analysis, and more detailed specifications, are noted in the explanatory footnotes to tables 1, 2, and 3 appended to this report.

1950 and continued through the next of the 1949-50 marketing season. The reported manufacturing income figures, therefore, have been adjusted for the veteran insurance dividend disbursements noted above. In the manufacturing income figures used for 1949-50 in the analysis, it has been necessary tentatively to make the value for May 1950, it has been estimated at the average value reflecting the 3-month period February 1950 through April 1950.

The level of competition caused fruit prices has been measured by an index constructed in the same manner as in the previous report on canned products; the computation of the index is explained in some detail in table 3 appended to this report. Here, it may be noted that the fruit prices of canned Bartlett pears are based on reports from California and Northwest canneries, and reflect actual operations of Pacific Coast canneries packing Bartlett pears. The fruit prices of canned clingstone peaches are based on reports from California canners and also reflect actual operations of the packers. The prices for canned deciduous fruit and canned apricots were compiled by the Extension Service of California and the prices of canned clingstone peaches were compiled by the Cling Peach Advisory Board. The prices of canned Hawaiian pineapple are based on published quotations supplemented by available trade information.

Specific sources for the several series of data used in the analysis, and more detailed specifications, are noted in the explanatory footnotes to tables 1, 2, and 3 appended to this report.

Technical Note.--With price as the dependent variable and the three factors mentioned above as the independent variables, the multiple linear regression equation fitted by the method of least square to the series covering the years 1926-27 through 1949-50 (excluding 1941-42 through 1946-47) is:

$$(1)\ X_1 = -13.239004 - \underset{(2.408246)}{0.359245X_2} + \underset{(11.343317)}{6.925151 \log_{10}X_3} + \underset{(4.955136)}{0.030158X_4}$$

where X_1 is the annual average f.o.b. price of California canned apricots(in dollars per case);

X_2 is the domestic shipments of California canned apricots (in units of 1,000,000 cases);

X_3 is the index of nonagricultural income in the United States (1935-1939= 100);

X_4 is the adjusted index of prices of competing canned fruits (1935-1939= 100);

the figures in parentheses are t-ratios of the net regression coefficients;

the adjusted coefficient of multiple correlation,

$$\bar{R}X_1 \cdot X_2, \log_{10}X_3, X_4 = 0.958$$

Technical Data.—With price as the dependent variable and the three factors mentioned above as the independent variables, the multiple linear regression equation fitted by the method of least squares to the series covering the years 1926-27 through 1929-30 (excluding 1928-29 through 1932-33) is:

$$(1)\quad X_1 = -12.8270X_2 + 0.8223X_3 + 0.0801X_4$$

$$(2.0220) \quad (11.3223) \quad (4.0512)$$

where X_1 is the annual average f.o.b. price of California canned apricots (in dollars per case);

X_2 is the domestic disposable of California canned apricots (in units of 1,000,000 cases);

X_3 is the index of consumptional income in the United States (1926-1929=100);

X_4 is the adjusted index of prices of competing canned fruits (1926-1929=100);

The figures in parentheses are probable of the net regression coefficients; the adjusted coefficient of multiple correlation,

$$\bar{R}X_1 \cdot X_2 X_3 X_4 = 0.989$$

TABLE 1

Statistical Analysis of Annual Average F.O.B.
Prices of California Canned Apricots
Variables Used in the Analyses
(1926-27 Through 1949-50, Excluding 1940-41 Through 1946-47)

Year, June through May	F.o.b. price canned apricots	Domestic shipments of canned apricots	Index of United States nonagricultural income	Adjusted index of prices of competing canned fruits
	1	2	3	4
	dollars per case	1,000 casesa/	1935-1939=100	1935-1939=100
1926-27	3.85	2,038	115.3	120.0
1927-28	3.97	1,779	116.2	108.7
1928-29	3.67	2,195	120.7	104.7
1929-30	3.97	2,259	120.2	124.0
1930-31	3.32	2,183	104.4	108.0
1931-32	2.64	1,541	85.5	108.4
1932-33	2.23	1,521	68.1	118.9
1933-34	2.37	2,034	75.5	123.3
1934-35	3.47	1,477	82.1	124.8
1935-36	2.93	1,951	91.0	108.1
1936-37	2.75	2,992	106.5	94.9
1937-38	3.02	2,901	103.3	106.0
1938-39	2.55	2,562	101.0	90.8
1939-40	2.77	2,640	109.6	90.5
1947-48	5.20	2,415	290.1	65.3
1948-49	4.55	3,528	308.0	64.7
1949-50b/	4.11	3,056	310.3	51.6

a/ No. 2½ can basis.
b/ Preliminary, subject to revision.

Sources of data:

Col. 1: Compiled from reports by canners. Prices are weighted average f.o.b. prices received by canners, for all grades and sizes of cans, on an unadvertised basis.

Col. 2: Column 7, table 2.

Col. 3: Simple average of the pack-year monthly indices of national income, excluding agricultural income, 1935-1939 average equals 100. Monthly income data compiled from U. S. Department of Commerce, Survey of Current Business. Index for 1950 estimated at a level of 314.7, the average of February-March 1950.

Col. 4: For sources and method of construction see table 3.

FIGURE 1

California Canned Apricots. Annual average F.O.B. prices received by canners related to: (A) domestic shipments of canned apricots; (B) index of nonagricultural income; and (C) adjusted index of prices of competing canned fruits; (1926-27 through 1949-50, excluding 1940-41 through 1946-47).

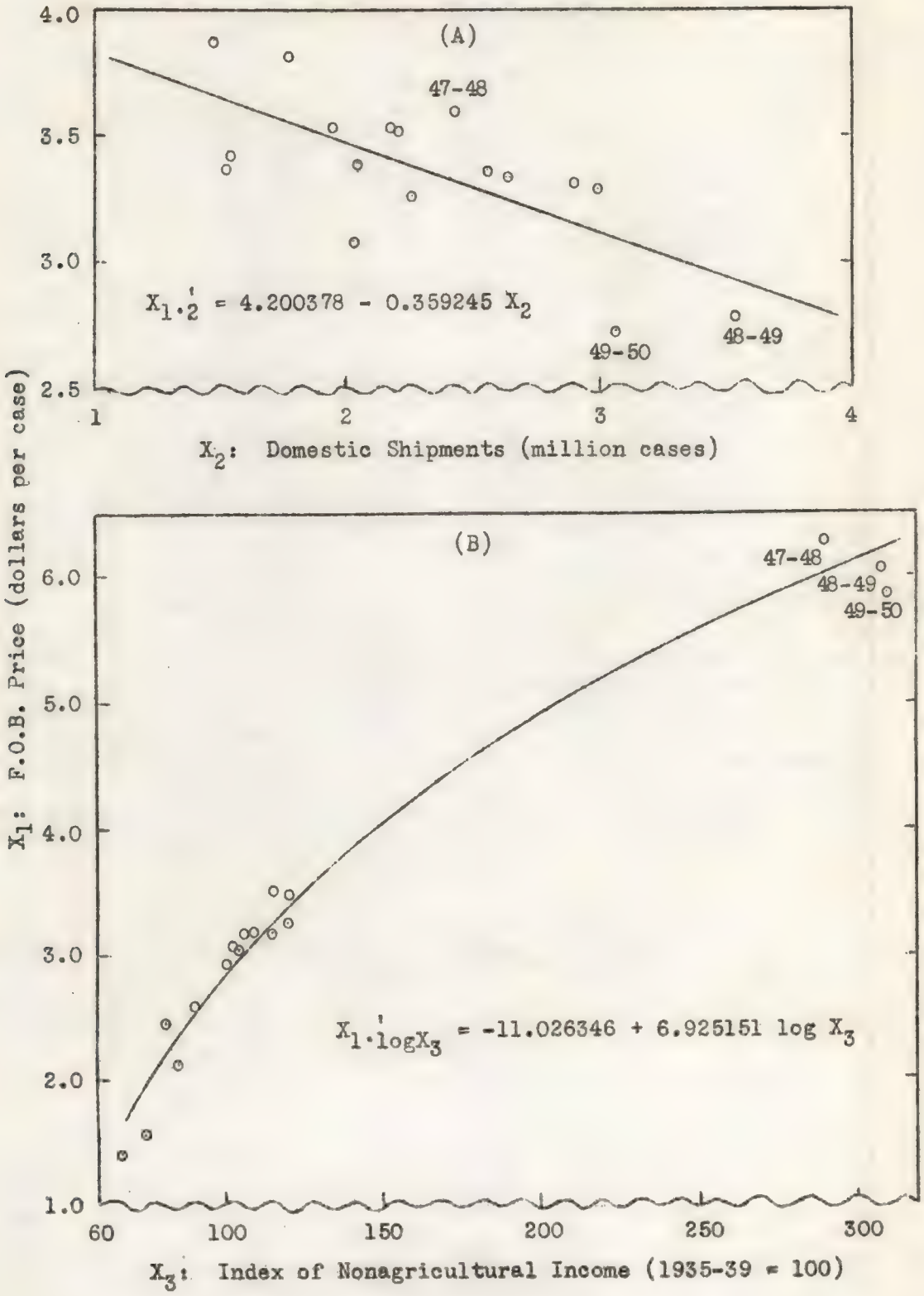

Figure 1 continued

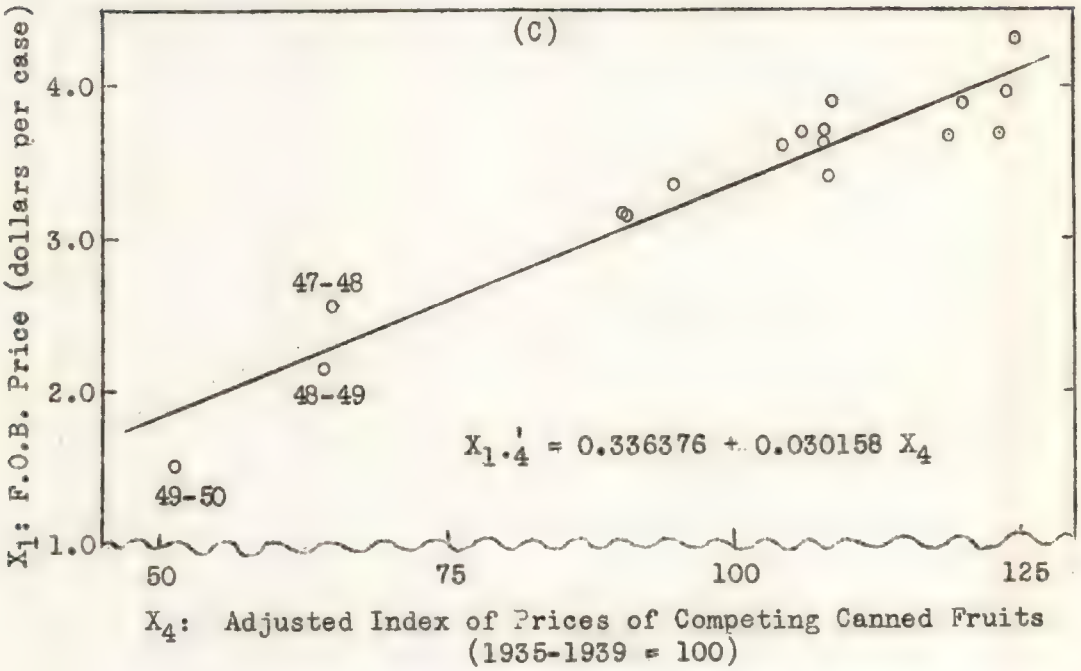

TABLE 2

California Canned Apricots: Pack, Carry-Over and Shipments

Year, June through May	Pack	Carry-over from preceding year	Available for shipment	Carry-over into following year	Total shipments	Exports	Domestic shipments
	1	2	3	4	5	6	7
	1,000 cases a/						
1926-27	3,227	21	3,248	401	2,847	809	2,038
1927-28	2,960	401	3,361	952	2,409	630	1,779
1928-29	1,991	952	2,943	154	2,789	594	2,195
1929-30	4,023	154	4,177	1,189	2,988	729	2,259
1930-31	1,954	1,189	3,143	546	2,597	414	2,183
1931-32	2,006	546	2,552	515	2,037	496	1,541
1932-33	1,805	515	2,320	323	1,997	476	1,521
1933-34	2,416	323	2,739	167	2,572	538	2,034
1934-35	1,774	167	1,941	227	1,714	237	1,477
1935-36	3,164	227	3,391	844	2,547	596	1,951
1936-37	2,899	844	3,743	228	3,515	523	2,992
1937-38	5,553	228	5,781	2,305	3,476	575	2,901
1938-39	1,547	2,305	3,852	528	3,324	762	2,562
1939-40	3,338	528	3,866	479	3,387	747	2,640
1947-48	3,063	279	3,342	639	2,703	288	2,415
1948-49	4,651	639	5,290	1,508	3,782	254	3,528
1949-50 b/	2,307.4	1,508.3	3,815.7	532	3,284	228	3,056

a/ No. 2½ can basis.
b/ Preliminary, subject to revision.

Sources of data:
Cols. 1 through 5: Compiled by Canners League of California.

Col. 6: U. S. Dept. of Commerce, Monthly Summary of Foreign Commerce (May 1950, estimated) converted at 45 pounds per case of 24 No. 2½ cans.

Col. 7: Column 5 minus column 6.

TABLE 3

Construction of Index Prices of Canned Fruits Competing with Canned Apricots

Year, June through May	Prices			Relatives of prices			Unadjusted index of prices of competing canned fruits	Index of United States nonagricultural income	Adjusted index of prices of competing canned fruits
	Canned clingstone peaches	Canned Bartlett pears	Canned Hawaiian pineapple	Canned clingstone peaches	Canned Bartlett pears	Canned Hawaiian pineapple			
	1	2	3	4	5	6	7	8	9
	dollars per case			1935-1939=100					
1926-27	3.66	4.31	4.70	142.2	144.1	130.6	138.4	115.3	120.0
1927-28	3.17	4.60	4.20	123.2	153.8	116.7	126.3	116.2	108.7
1928-29	3.22	4.13	4.40	125.1	138.1	122.2	126.4	120.7	104.7
1929-30	4.08	4.82	4.70	158.5	161.2	130.6	149.1	120.2	124.0
1930-31	2.88	3.53	4.00	111.9	118.1	111.1	112.7	104.4	108.0
1931-32	2.55	2.82	3.00	99.1	94.3	83.3	92.7	85.5	108.4
1932-33	1.97	2.48	3.10	76.5	82.9	86.1	81.0	68.1	118.9
1933-34	2.31	2.64	3.60	89.7	88.3	100.0	93.1	75.5	123.3
1934-35	2.69	3.05	3.60	104.5	102.0	100.0	102.5	82.1	124.8
1935-36	2.51	2.92	3.60	97.5	97.7	100.0	98.4	91.0	108.1
1936-37	2.66	2.92	3.60	103.3	97.7	100.0	101.1	106.5	94.9
1937-38	2.96	3.07	3.80	115.0	102.7	105.6	109.5	103.3	106.0
1938-39	2.30	2.77	3.40	89.4	92.6	94.4	91.7	101.0	90.8
1939-40	2.44	3.27	3.60	94.8	109.4	100.0	99.2	109.6	90.5
1947-48	4.70	7.07	5.80	182.6	236.5	161.1	189.5	290.1	65.3
1948-49	4.86	7.37	6.50	188.8	246.5	180.6	199.4	308.0	64.7
1949-50 a/	3.94	5.15	6.00	153.1	172.2	166.7	160.1	310.3	51.6

a/ Preliminary, subject to revision.

Sources of data:

Cols. 1 and 2: Compiled from reports by canners. Prices are weighted average f.o.b. prices for all grades and sizes of cans, on an unadvertised basis. Canned clingstone peach prices are for California; and canned Bartlett pear prices are for the Pacific Coast, except 1947-48 is for California.

(Continued on next page.)

Table 3 continued.

Col. 3: Prices are for No. 2-1/2 sliced fancy pineapple, Hawaiian, f.o.b. San Francisco from published quotations supplemented by trade information.

Cols. 4, 5, and 6: Prices given in cols. 1, 2, and 3, respectively, in per cent of their 1935-1939 averages--canned clingstone peaches, $2.574; canned Bartlett pears, $2.990; canned pineapples, $3.60.

Col. 7: Weighted combination of relatives in cols. 4, 5, and 6 using the following weights--canned clingstone peaches, 8; canned Bartlett pears, 3; canned pineapples, 3.

Col. 8: From table 1, col. 3.

Col. 9: Col. 7 divided by col. 8.

TABLE 4

Actual and Estimated F.O.B. Prices of California Canned Apricots
(1926-27 Through 1949-50, Excluding 1940-41 Through 1946-47)

Year, June through May	Actual price	Estimated price	Difference column 2 minus column 1	Column 3 as per cent of column 1
	1	2	3	4
	dollars per case			per cent
1926-27	3.85	3.93	-0.08	- 2.08
1927-28	3.97	3.70	0.27	6.80
1928-29	3.67	3.55	0.12	3.27
1929-30	3.97	4.09	-0.12	- 3.02
1930-31	3.32	3.21	0.11	3.31
1931-32	2.64	2.86	-0.22	- 8.33
1932-33	2.23	2.50	-0.27	-12.11
1933-34	2.37	2.75	-0.38	-16.03
1934-35	3.47	3.25	0.22	6.34
1935-36	2.93	2.89	0.04	1.37
1936-37	2.75	2.59	0.16	5.82
1937-38	3.02	2.86	0.16	5.30
1938-39	2.55	2.46	0.09	3.53
1939-40	2.77	2.67	0.10	3.61
1947-48	5.20	4.92	0.28	5.38
1948-49	4.55	4.68	-0.13	- 2.86
1949-50a/	4.11	4.48	-0.37	- 9.00

a/ Preliminary.

Sources of data:
- Col. 1: From table 1, column 1.
- Col. 2: Estimated by equation 1, page 4.
- Col. 3: Column 1 minus column 2.
- Col. 4: Column 3 as per cent of column 1.

TABLE [illegible]

Actual and Estimated F.O.B. Prices of California Canned Apricots (1926-27 Through 1949-50, Excluding 1940-41 Through 1946-47)

Year, June through May	Actual price	Estimated price	Difference: column 2 minus column 1	Column 3 as per cent of column 1
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1928-29	3.67	3.55	0.12	3.27
1929-30	3.97	4.09	-0.12	- 3.02
1930-31	3.32	3.21	0.11	3.31
1931-32	2.64	2.86	-0.22	- 8.33
1932-33	2.23	2.50	-0.27	-12.11
1933-34	2.37	2.75	-0.38	-16.03
1934-35	3.47	3.25	0.22	6.34
1935-36	2.93	2.89	0.04	1.37
1936-37	2.75	2.59	0.16	6.82
1937-38	3.02	2.86	0.16	5.30
1938-39	2.55	2.46	0.09	3.53
1939-40	2.77	2.67	0.10	3.61
1947-48	5.20	4.92	0.28	5.38
1948-49	4.55	4.68	-0.13	- 2.86
1949-50a/	4.12	4.49	-0.37	- 8.00

a/ Preliminary.

Sources of data:

Col. 1: From table 1, column 1.
Col. 2: Estimated by equation 1, page 14.
Col. 3: Column 1 minus column 2.
Col. 4: Column 3 as per cent of column 1.